DATA SHEET

74ABT162244
74ABTH162244

16-bit buffer/line driver with 30Ω series termination resistors (3-State)

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74ABTH162244

FEATURES

- 16-bit bus interface

- Multiple V_{CC} and GND pins minimize switching noise

- Power-up 3-State

- 3-State buffers

- Output capability: +12 mA/–32mA

- Live insertion/extraction permitted

- Latch-up protection exceeds 500mA per JEDEC Std 17

- ESD protection exceeds 2000 V per MIL STD 883 Method 3015 and 200 V per Machine Model

- Same part as 74ABT162244-1

- 74ABTH162244 incorporates bus hold data inputs which eliminate the need for external pull–up resistors to hold unused inputs

- Bus-hold data inputs eliminate the need for external pull-up resistors to hold unused inputs

DESCRIPTION

The 74ABT162244 high-performance BiCMOS device combines low static and dynamic power dissipation with high speed.
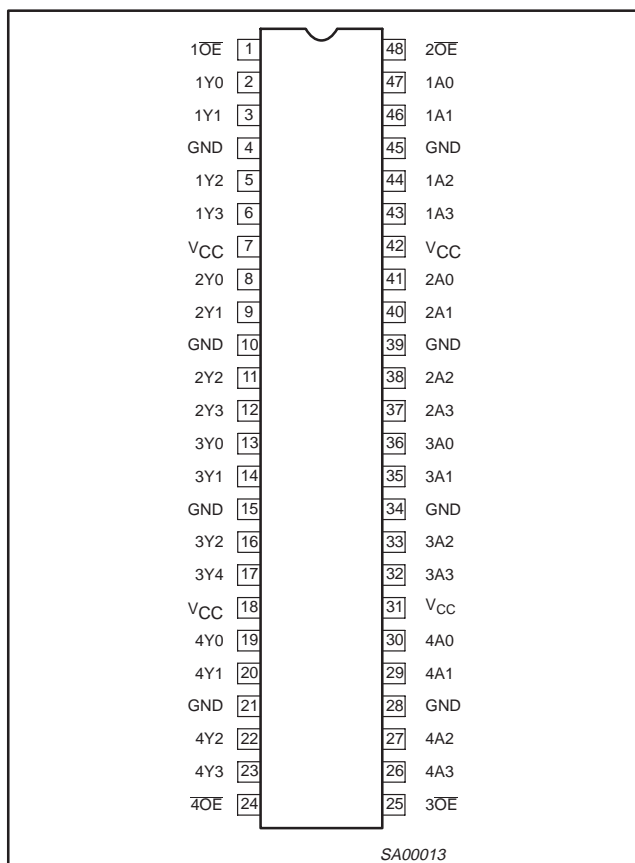
The 74ABT162244 device is a 16-bit buffer that is ideal for driving bus lines. The device features four Output Enables ($1\overline{OE}$, $2\overline{OE}$, $3\overline{OE}$, $4\overline{OE}$), each controlling four of the 3-State outputs.

The 74ABT162244 is designed with 30Ω series resistance in both the upper and lower output structures. This design reduces line noise in applications such as memory address drivers, clock drivers and bus receivers/transmitters.

The 74ABT162244 is the same as the 74ABT16244-1. The part number has been changed to reflect industry standards.

Two options are available, 74ABT162244 which does not have the bus hold feature and the 74ABTH162244 which incorporates the bus hold feature.

PIN CONFIGURATION

Pin	Signal		Pin	Signal
1	$1\overline{OE}$		48	$2\overline{OE}$
2	1Y0		47	1A0
3	1Y1		46	1A1
4	GND		45	GND
5	1Y2		44	1A2
6	1Y3		43	1A3
7	V_{CC}		42	V_{CC}
8	2Y0		41	2A0
9	2Y1		40	2A1
10	GND		39	GND
11	2Y2		38	2A2
12	2Y3		37	2A3
13	3Y0		36	3A0
14	3Y1		35	3A1
15	GND		34	GND
16	3Y2		33	3A2
17	3Y4		32	3A3
18	V_{CC}		31	V_{CC}
19	4Y0		30	4A0
20	4Y1		29	4A1
21	GND		28	GND
22	4Y2		27	4A2
23	4Y3		26	4A3
24	$4\overline{OE}$		25	$3\overline{OE}$

SA00013

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS T_{amb} = 25°C; GND = 0V	TYPICAL	UNIT
t_{PLH} t_{PHL}	Propagation delay nAx to nYx	C_L = 50pF; V_{CC} = 5V	1.8 3.2	ns
C_{IN}	Input capacitance	V_I = 0V or V_{CC}	3	pF
C_{OUT}	Output capacitance	V_O = 0V or V_{CC}; 3-State	7	pF
I_{CCZ}	Quiescent supply current	Outputs disabled; V_{CC} = 5.5V	500	μA
I_{CCL}		Outputs Low; V_{CC} = 5.5V	10	mA

ORDERING INFORMATION

| PACKAGES	TEMPERATURE RANGE	OUTSIDE NORTH AMERICA	NORTH AMERICA	DWG NUMBER
48-Pin Plastic SSOP Type III	−40°C to +85°C	74ABT162244 DL	BT162244 DL	SOT370-1
48-Pin Plastic TSSOP Type II	−40°C to +85°C	74ABT162244 DGG	BT162244 DGG	SOT362-1
48-Pin Plastic SSOP Type III	−40°C to +85°C	74ABTH162244 DL	BH162244 DL	SOT370-1
48-Pin Plastic TSSOP Type II	−40°C to +85°C	74ABTH162244 DGG	BH162244 DGG	SOT362-1

LOGIC SYMBOL

SA00014
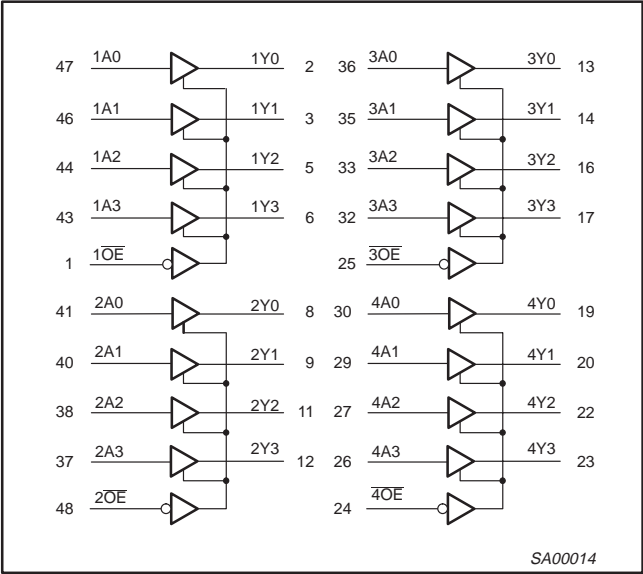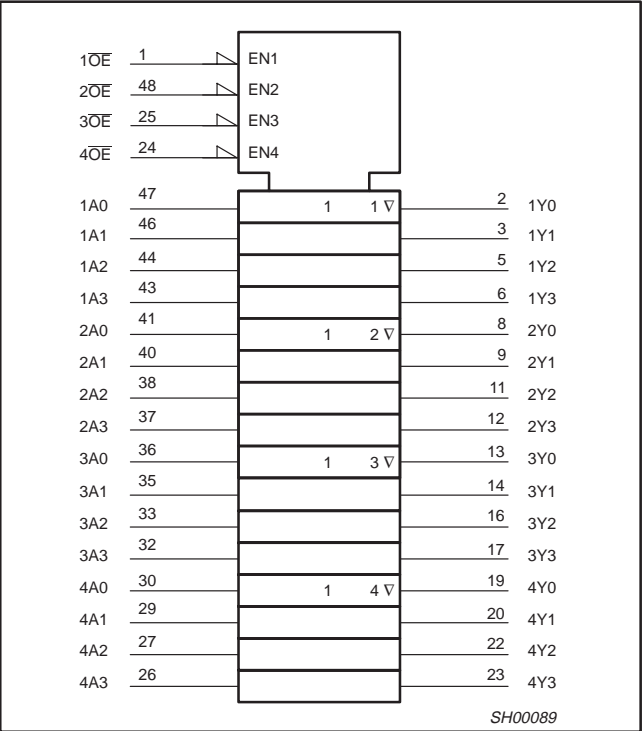
FUNCTION TABLE

INPUTS		OUTPUTS
n$\overline{\text{OE}}$	nAx	nYx
L	L	L
L	H	H
H	X	Z

H = High voltage level
L = Low voltage level
X = Don't care
Z = High impedance "off" state

SCHEMATIC OF Y OUTPUTS

SA00042

LOGIC SYMBOL (IEEE/IEC)

SH00089
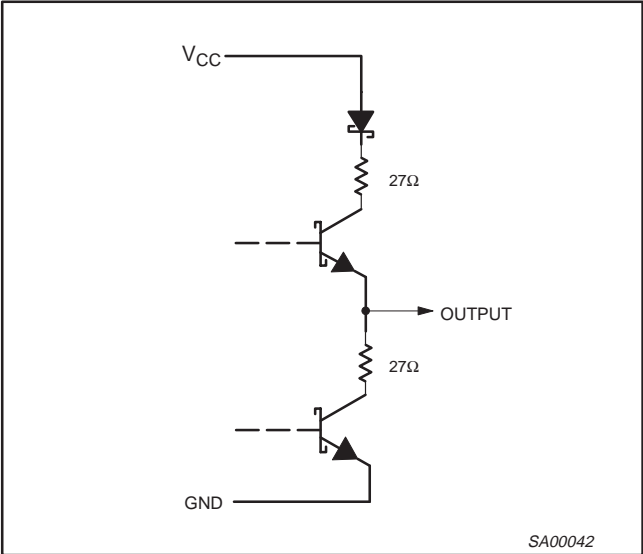
PIN DESCRIPTION

PIN NUMBER	SYMBOL	NAME AND FUNCTION
47, 46, 44, 43 41, 40, 38, 37 36, 35, 33, 32 30, 29, 27, 26	1A0 – 1A3, 2A0 – 2A3, 3A0 – 3A3, 4A0 – 4A3	Data inputs
2, 3, 5, 6 8, 9, 11, 12 13, 14, 16, 17 19, 20, 22, 23	1Y0 – 1Y3, 2Y0 – 2Y3, 3Y0 – 3Y3, 4Y0 – 4Y3	Data outputs
1, 48 25, 24	1$\overline{\text{OE}}$, 2$\overline{\text{OE}}$, 3$\overline{\text{OE}}$, 4$\overline{\text{OE}}$	Output enables
4, 10, 15, 21 28, 34, 39, 45	GND	Ground (0V)
7, 18, 31, 42	V$_{CC}$	Positive supply voltage

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Product specification

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termination resistors (3-State)

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74ABTH162244

ABSOLUTE MAXIMUM RATINGS[1, 2]

SYMBOL	PARAMETER	CONDITIONS	RATING	UNIT
V_{CC}	DC supply voltage		−0.5 to +7.0	V
I_{IK}	DC input diode current	$V_I < 0$	−18	mA
V_I	DC input voltage[3]		−1.2 to +7.0	V
I_{OK}	DC output diode current	$V_O < 0$	−50	mA
V_{OUT}	DC output voltage[3]	output in Off or High state	−0.5 to +5.5	V
I_{OUT}	DC output current	output in Low state	128	mA
		output in High state	−64	
T_{stg}	Storage temperature range		−65 to 150	°C

NOTES:
1. Stresses beyond those listed may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
2. The performance capability of a high-performance integrated circuit in conjunction with its thermal environment can create junction temperatures which are detrimental to reliability. The maximum junction temperature of this integrated circuit should not exceed 150°C.
3. The input and output voltage ratings may be exceeded if the input and output current ratings are observed.

RECOMMENDED OPERATING CONDITIONS

SYMBOL	PARAMETER	LIMITS		UNIT
		Min	Max	
V_{CC}	DC supply voltage	4.5	5.5	V
V_I	Input voltage	0	V_{CC}	V
V_{IH}	High-level input voltage	2.0		V
V_{IL}	Low-level input voltage		0.8	V
I_{OH}	High-level output current		−32	mA
I_{OL}	Low-level output current		12	mA
$\Delta t/\Delta v$	Input transition rise or fall rate	0	10	ns/V
T_{amb}	Operating free-air temperature range	−40	+85	°C

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DC ELECTRICAL CHARACTERISTICS

SYMBOL	PARAMETER	TEST CONDITIONS		LIMITS					UNIT
				$T_{amb} = +25°C$			$T_{amb} = -40°C$ to $+85°C$		
				Min	Typ	Max	Min	Max	
V_{IK}	Input clamp voltage	$V_{CC} = 4.5V$; $I_{IK} = -18mA$			−0.9	−1.2		−1.2	V
V_{OH}	High-level output voltage[3]	$V_{CC} = 4.5V$; $I_{OH} = -3mA$; $V_I = V_{IL}$ or V_{IH}		2.5	2.9		2.5		V
		$V_{CC} = 5V$; $I_{OH} = -3mA$; $V_I = V_{IL}$ or V_{IH}		3.0	3.4		3.0		V
		$V_{CC} = 4.5V$; $I_{OH} = -32mA$; $V_I = V_{IL}$ or V_{IH}		2.0	2.4		2.0		V
V_{OL}	Low-level output voltage	$V_{CC} = 4.5V$; $I_{OL} = 8mA$; $V_I = V_{IL}$ or V_{IH}				0.65		0.65	V
		$V_{CC} = 4.5V$; $I_{OL} = 12mA$; $V_I = V_{IL}$ or V_{IH}				0.80		0.80	V
I_I	Input leakage current	$V_{CC} = 5.5V$; $V_I = GND$ or $5.5V$			±0.01	±1.0		±1.0	μA
I_I	Input leakage current 74ABTH162244	$V_{CC} = 5.5V$; $V_I = V_{CC}$ or GND	Control pins		±0.01	±1.0		±1.0	μA
		$V_{CC} = 5.5V$; $V_I = V_{CC}$	Data pins		0.01	1.0		1.0	μA
		$V_{CC} = 5.5V$; $V_I = 0$			−2.0	−3.0		−5.0	μA
I_{HOLD}	Bus Hold Current A Inputs[4] 74ABTH162244	$V_{CC} = 4.5V$; $V_I = 0.8V$		50			50		μA
		$V_{CC} = 5.5V$; $V_I = 2.0V$		−75			−75		
		$V_{CC} = 5.5V$; $V_I = 0$ to $5.5V$		±500					
I_{OFF}	Power-off leakage current	$V_{CC} = 0.0V$; V_O or $V_I \leq 4.5V$			±5.0	±100		±100	μA
$I_{PU/PD}$	Power-up/down 3-State output current	$V_{CC} = 2.0V$; $V_O = 0.5V$; $V_I = GND$ or V_{CC}; $V_{\overline{OE}} = $ Don't care			±5.0	±50		±50	μA
I_{OZH}	3-State output High current	$V_{CC} = 5.5V$; $V_O = 5.5V$; $V_I = V_{IL}$ or V_{IH}			0.1	10		10	μA
I_{OZL}	3-State output Low current	$V_{CC} = 5.5V$; $V_O = 0.0V$; $V_I = V_{IL}$ or V_{IH}			−0.1	−10		−10	μA
I_{CEX}	Output High leakage current	$V_{CC} = 5.5V$; $V_O = 5.5V$; $V_I = GND$ or V_{CC}			5.0	50		50	μA
I_O	Output current[1]	$V_{CC} = 5.5V$; $V_O = 2.5V$		−50	−100	−180	−50	−180	mA
I_{CCH}	Quiescent supply current[3]	$V_{CC} = 5.5V$; Outputs High, $V_I = GND$ or V_{CC}			0.50	1.0		1.0	mA
I_{CCL}		$V_{CC} = 5.5V$; Outputs Low, $V_I = GND$ or V_{CC}			10	19		19	mA
I_{CCZ}		$V_{CC} = 5.5V$; Outputs 3-State; $V_I = GND$ or V_{CC}			0.50	1.0		1.0	mA
ΔI_{CC}	Additional supply current per input pin[2, 3]	Outputs enabled, one data input at 3.4V, other inputs at V_{CC} or GND; $V_{CC} = 5.5V$			100	250		250	μA
		Outputs disabled, one data input at 3.4V, other inputs at V_{CC} or GND; $V_{CC} = 5.5V$			100	250		250	μA
		Control pins, outputs disabled, one enable input at 3.4V, other inputs at V_{CC} or GND; $V_{CC} = 5.5V$			100	250		250	μA

NOTES:
1. Not more than one output should be tested at a time, and the duration of the test should not exceed one second.
2. This is the increase in supply current for each input at 3.4V.
3. This data sheet limit may vary among suppliers.
4. This is the bus hold overdrive current required to force the input to the opposite logic state.

16-bit buffer/line driver with 30Ω series
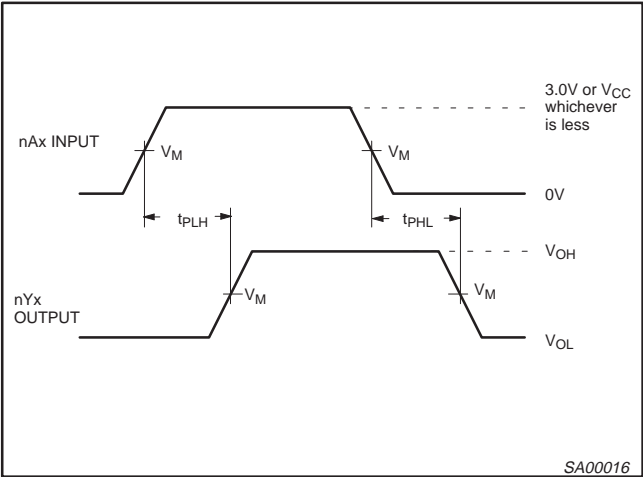termination resistors (3-State)

74ABT162244
74ABTH162244

AC CHARACTERISTICS

GND = 0V; t_R = t_F = 2.5ns; C_L = 50pF, R_L = 500Ω

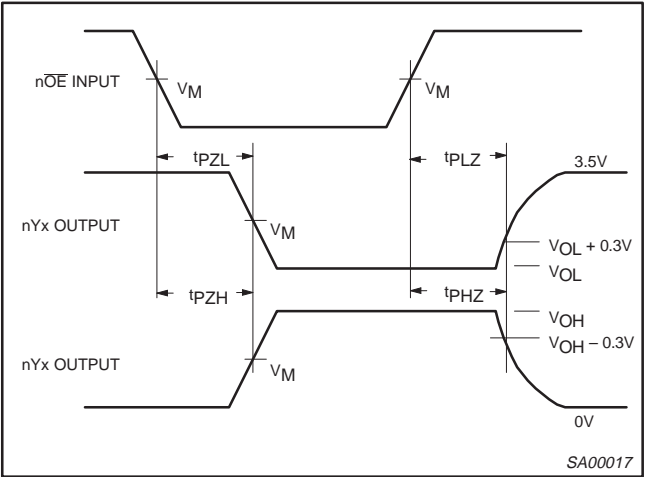| SYMBOL	PARAMETER	WAVEFORM	LIMITS					UNIT
			T_{amb} = +25°C V_{CC} = +5.0V			T_{amb} = −40°C to +85°C V_{CC} = +5.0V ±0.5V		
			Min	Typ	Max	Min	Max	
t_{PLH} t_{PHL}	Propagation delay nAx to nYx	1	1.0 1.6	1.8 3.2	2.4 4.0	1.0 1.6	2.7 4.4	ns
t_{PZH} t_{PZL}	Output enable time to High and Low level	2	1.2 2.6	2.7 5.0	3.5 6.2	1.2 2.6	4.3 7.3	ns
t_{PHZ} t_{PLZ}	Output disable time from High and Low level	2	1.5 1.3	3.0 2.6	3.8 3.3	1.5 1.3	4.5 4.6	ns

AC WAVEFORMS

V_M = 1.5V, V_{IN} = GND to 3.0V

SA00016

Waveform 1.   Input (An) to Output (Yn) Propagation Delays

SA00017

Waveform 2.   3-State Output Enable and Disable Times

TEST CIRCUIT AND WAVEFORMS

Test Circuit for 3-State Outputs

Input Pulse Definition

$V_M = 1.5V$

SWITCH POSITION

TEST	SWITCH
t_{PLZ}	closed
t_{PZL}	closed
All other	open

DEFINITIONS

R_L = Load resistor; see AC CHARACTERISTICS for value.

C_L = Load capacitance includes jig and probe capacitance; see AC CHARACTERISTICS for value.

R_T = Termination resistance should be equal to Z_{OUT} of pulse generators.

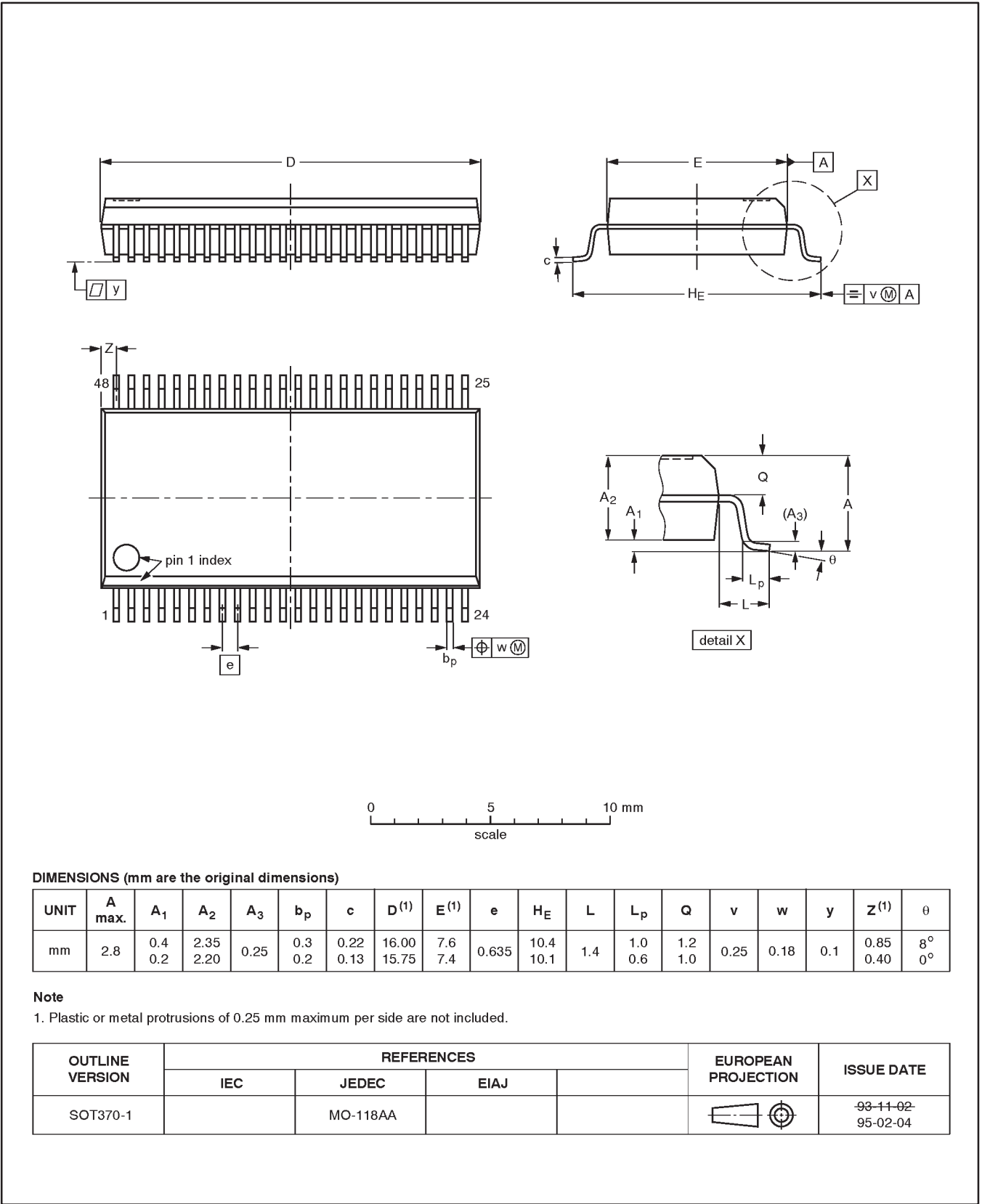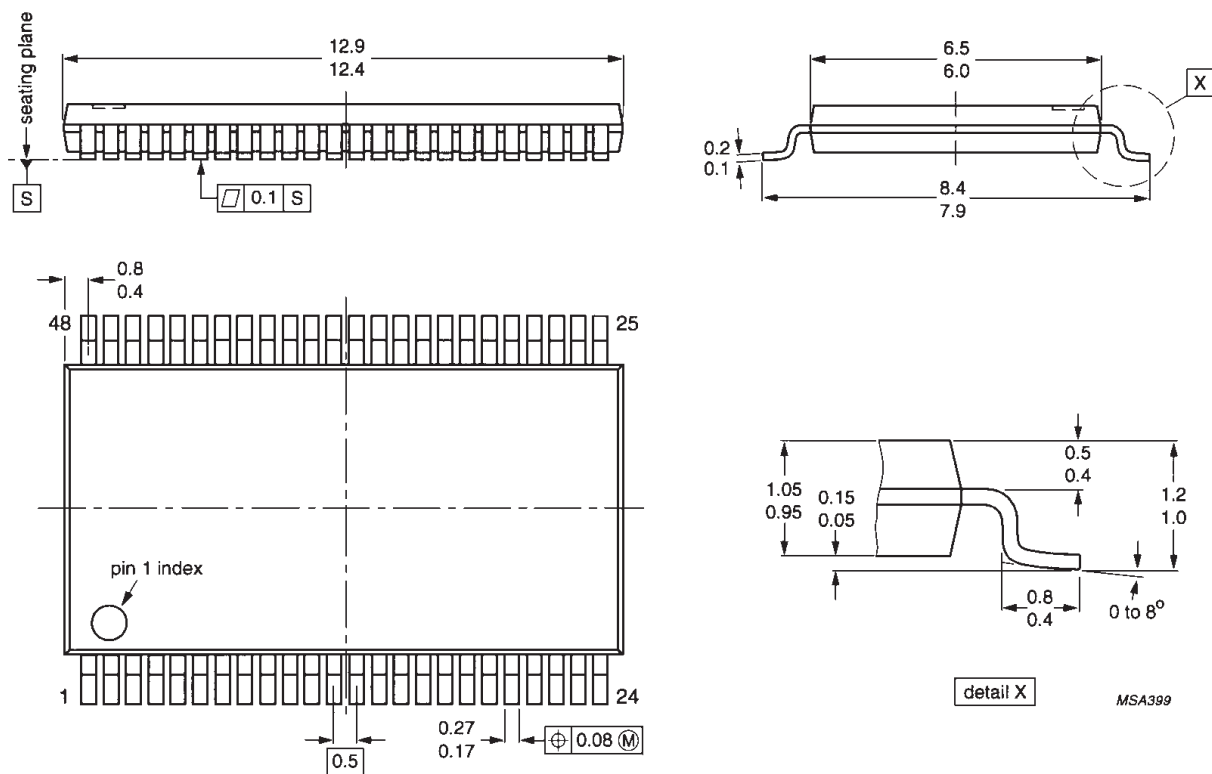| FAMILY	INPUT PULSE REQUIREMENTS				
	Amplitude	Rep. Rate	t_W	t_R	t_F
74ABT/H16	3.0V	1MHz	500ns	2.5ns	2.5ns

SA00018

16-bit buffer/line driver with 30Ω series
termination resistors (3-State)

74ABT162244
74ABTH162244

SSOP48: plastic shrink small outline package; 48 leads; body width 7.5 mm

SOT370-1

DIMENSIONS (mm are the original dimensions)

UNIT	A max.	A₁	A₂	A₃	b_p	c	D [1]	E [1]	e	H_E	L	L_p	Q	v	w	y	Z [1]	θ
mm	2.8	0.4 0.2	2.35 2.20	0.25	0.3 0.2	0.22 0.13	16.00 15.75	7.6 7.4	0.635	10.4 10.1	1.4	1.0 0.6	1.2 1.0	0.25	0.18	0.1	0.85 0.40	8° 0°

Note

1. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT370-1		MO-118AA				~~93-11-02~~ 95-02-04

TSSOP48:   plastic thin shrink small outline package; 48 leads; body width 6.1mm   **SOT362-1**

Dimensions in mm.

MSA399

16-bit buffer/line driver with 30Ω series termination resistors (3-State)	74ABT162244 74ABTH162244

Data sheet status

Data sheet status	Product status	Definition [1]
Objective specification	Development	This data sheet contains the design target or goal specifications for product development. Specification may change in any manner without notice.
Preliminary specification	Qualification	This data sheet contains preliminary data, and supplementary data will be published at a later date. Philips Semiconductors reserves the right to make chages at any time without notice in order to improve design and supply the best possible product.
Product specification	Production	This data sheet contains final specifications. Philips Semiconductors reserves the right to make changes at any time without notice in order to improve design and supply the best possible product.

[1]   Please consult the most recently issued datasheet before initiating or completing a design.

Definitions

Short-form specification — The data in a short-form specification is extracted from a full data sheet with the same type number and title. For detailed information see the relevant data sheet or data handbook.

Limiting values definition — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

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print code   Date of release: 05-96

Document order number: 9397-750-04708

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